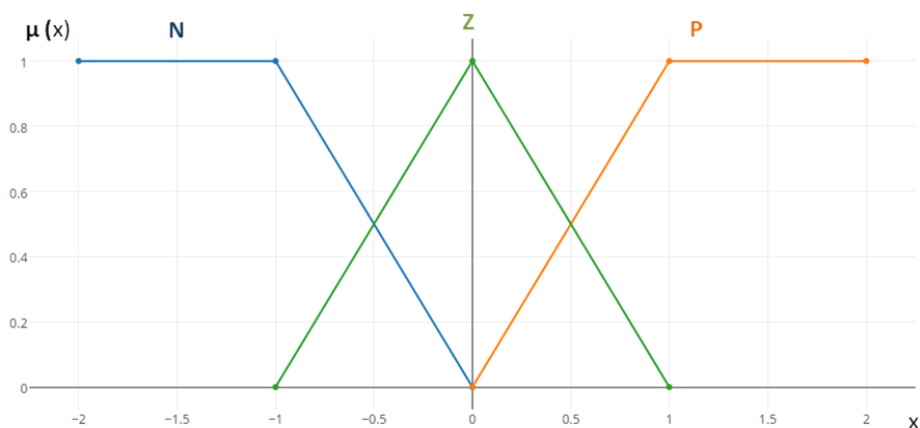


- 1- Explain the limitations of using conventional controllers.
- 2- What are the advantages of fuzzy controllers?
- 3- Explain with example the main difference between a binary set and a fuzzy set.
- 4- What is meant by the universe of discourse of fuzzy set?
- 5- Draw a membership function that:
 - a) quantifies the set of all people of medium height.
 - b) quantifies the set of all short people.
 - c) quantifies the set of all tall people.
 - d) quantifies the statement “the number x is near 10.”
 - e) quantifies the statement “the number x is less than 10.”
 - f) quantifies the statement “the number x is greater than 10.”
- 6- For the following MFs:



- a) Find the MF degree (μ) for the fuzzy sets N , Z and P for:
 $x = -0.25$ & $x = 0.25$ & $x = -0.1$ & $x = 0.1$ & $x = -0.5$ & $x = 0.5$
- b) Find the support and core for the fuzzy sets N , Z and P .

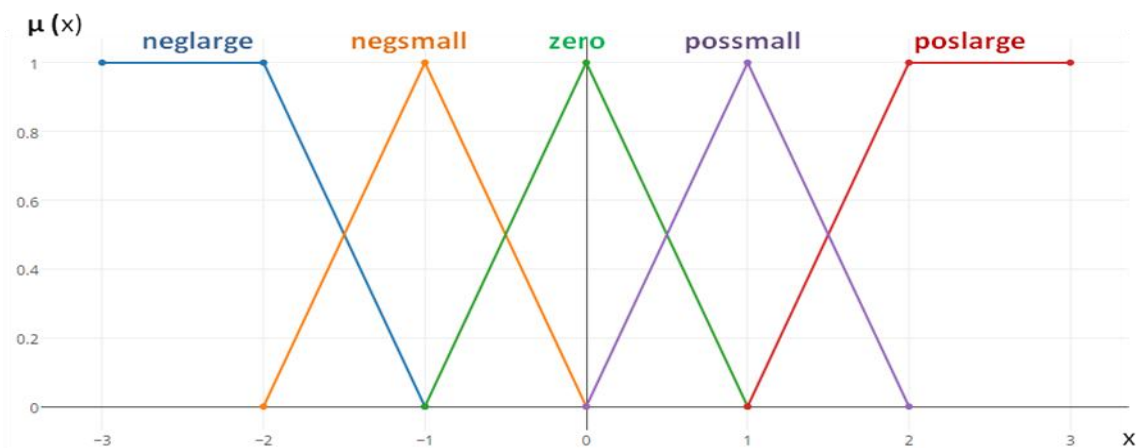
7- Consider two fuzzy sets:

Long pencils = {pencil1 / 0.1, pencil2 / 0.2, pencil3 / 0.4, pencil4 / 0.6, pencil5 / 0.8, pencil6 / 1}, **medium pencils** = {pencil1 / 1, pencil2 / 0.6, pencil3 / 0.4, pencil4 / 0.3, pencil5 / 0.1}.

h) Determine the results of the union and the intersection of these fuzzy sets.

i) Also, find the fuzzy set that represents "not long pencils and not medium pencils".

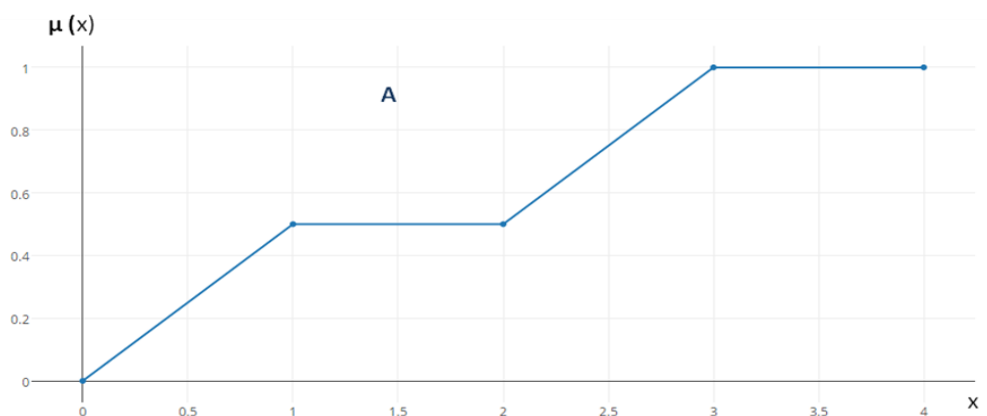
8- Consider the membership functions shown below. Sketch the membership function for the possibility "**error is zero and error is possmall**" using both the minimum and the product operations used for and logic. Also sketch the membership function for the possibility "**error is zero or error is possmall**" using both the maximum operation and the algebraic sum used for or logic.



9- Choose one of the fuzzy controller's applications and explain in brief the role of the fuzzy controller in this application.

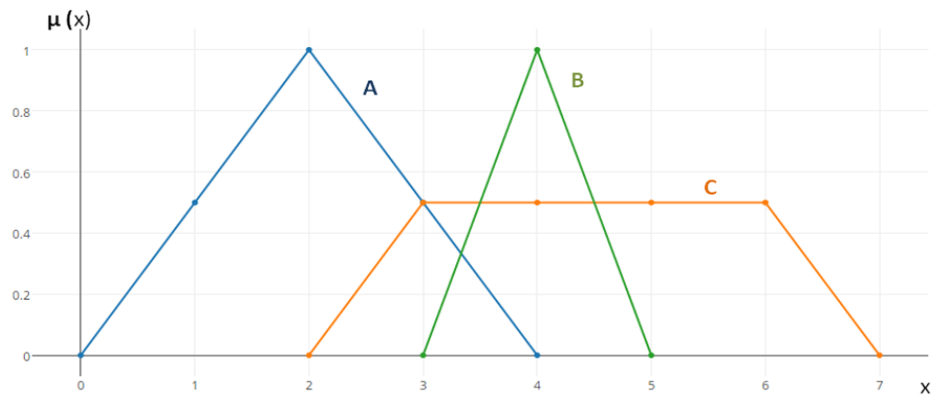
10- For the following fuzzy sets:

Draw A^-



Fuzzy Logic Control (FLC)

Draw:



- a) $A \cup C$
- b) $A \cap C$
- c) $A \cup B$
- d) $A \cap B$
- e) $A \cup B \cup C$
- f) $A \cap B \cap C$

11- State whether the fuzzy sets **A** and **B** are **convex** or **non convex**, **normal** or **subnormal**.

